

What is claimed is:

1. An animal fiber which is superior in shrink proofing and pilling resistance, and also maintains a water repellent property that animal fibers originally possess.

2. The animal fiber according to Claim 1, wherein the shrink proofing is set to an area shrinkage rate of not more than 8 % in a three-hours aqueous washing, when measured as a felting shrinkage rate in conformity with a WM TM 31 method (Wool Mark Test Method 31).

3. The animal fiber according to Claim 1, wherein, as a measure of shrink proofing, the value represented by a difference ($\mu_a - \mu_w$) between the coefficient of friction in the tip to root direction (μ_a) and the coefficient of friction in the root to tip direction (μ_w) with respect to a fiber direction, measured in accordance with JIS L-1015 method, is lowered by 30% or more in comparison with the difference ($\mu_a - \mu_w$) of untreated animal fiber in coefficient of static friction or in coefficient of dynamic friction, with the value of μ_a is approximately the same as a value in the case of the untreated animal fiber, and the value of μ_w is higher by 30 % or more in comparison with a value in the case of the untreated animal fiber.

4. The animal fiber according to Claim 1, wherein the pilling resistance is not lower than third class in JIS L-1076.6.1A method.

5. The animal fiber according to Claim 1, wherein, supposing that an absorbance of an absorption band

corresponding to amide I is set to 1 in a reflection FT-IR measuring method, the degree of oxidation of a -S-S- bond (cystine bond) in an epidermal cell of the animal fiber is represented by a relative absorbance of not less than 0.1 in an absorption band of -SO₃H group (sulfonic acid group) and/or a relative absorbance of not less than 0.08 in an absorption band of -S-SO₃Na group (Bunte salts).

6. The animal fiber according to Claim 1, wherein, as a measure of the shrink proofing, an animal fiber has an area shrinkage rate of not more than 8 % in a three-hours aqueous washing, when measured as a felting shrinkage rate in conformity with a WM TM 31 method (Wool Mark Test Method 31), and/or wherein, as a measure of shrink proofing, the value represented by a difference ($\mu_s - \mu_w$) between the coefficient of friction in the tip to root direction (μ_s) and the coefficient of friction in the root to tip direction (μ_w) with respect to a fiber direction, measured in accordance with JIS L-1015 method, is lower by 30 % or more in comparison with the difference ($\mu_s - \mu_w$) of untreated animal fiber in coefficient of static friction or in coefficient of dynamic friction, the value of μ_s is approximately the same as a value in the case of the untreated animal fiber, and the value of μ_w is higher by 30% or more in comparison with a value in the case of the untreated animal fiber, and further, wherein the pilling resistance is not lower than third class in JIS L-1076.6.1A method.

7. The animal fiber according to Claim 1 or 6, wherein

the animal fiber is one selected from the group consisting of wool, mohair, alpaca, cashmere, llama, vicuna, camel and angora.

8. A method for preparation of animal fiber according to Claim 1 or 6, which comprises;

a) a first step in which a -S-S- bond (cystine bond) in an animal fiber cuticle cell is treated by primary oxidation into lower order oxidized state,

b) a second step in which the primary-oxidized -S-S- bond is treated by oxidation into any one or more higher order oxidized states of di, tri or tetra-oxidized state, and

c) a third step in which said -S-S- bond in di, tri or tetra-oxidized state is treated by reduction cleavage.

9. A method for preparation of animal fiber according to Claim 1 or 6, which comprises;

a) a first step in which a -S-S- bond in an animal fiber cuticle cell is treated by primary oxidation with an oxidizer having an ability to oxidize a cystine -S-S-bond in animal fiber,

b) a second step in which the primary-oxidized -S-S- bond is treated by oxidation with ozone into any one or more higher order oxidized states of di, tri or tetra-oxidized state, and

c) a third step in which said -S-S- bond in higher oxidized state is treated by reduction cleavage.

10. The method for preparation of animal fiber according to Claim 9 wherein the oxidizer is one or a

mixture of two or more selected from the group consisting of persulfuric acid, peracetic acid, performic acid, neutral salts and acidic salts of these per-acids, potassium permanganate and hydrogen peroxide.

5 11. The method for preparation of animal fiber according to Claim 9 wherein the first step is conducted by a pad steam method of animal fiber into aqueous solution of oxidizing agent.

10 12. The method for preparation of animal fiber according to Claim 10 wherein the first step is conducted by a pad steam method of animal fiber into aqueous solution of oxidizing agent.

15 13. The method for preparation of animal fiber according to Claim 9 wherein the oxidation treatment with ozone is conducted by blowing aqueous ozone treating liquid containing ozone in the form of ultrafine bubbles of 5 μ or less to animal fiber in this ozone treating liquid.

20 14. The method for preparation of animal fiber according to Claim 9 wherein the animal fiber is used as cloth or sliver mainly composed of animal fibers.

 15. An animal fiber superior in shrink proofing and pilling resistance obtained by the method according to Claim 8.

25 16. An animal fiber superior in shrink proofing and pilling resistance obtained by the method according to Claim 9.